

Exercise Sheet No. 11 - Programming  
**Energy Informatics**  
Winter 2015-2016

**Exercise 1: (Class Diagram)**

For the *power\_Consumption* ER diagram, create the corresponding class diagram. Design the following methods on building:

- Total space, total number of occupants
- Yearly prediction for the total meter readings of all households
- Average reading value per occupant

And implement them in Python.

**Exercise 2: (Modeling - 1)**

Let's model a coffee maker. A recipe consists of

- an amount of water (int in ml)
- an amount of coffee powder (float in g)
- an amount of milk powder (float in g)
- draw a class diagram for class CoffeeRecipe
- implement it in Python
- implement two examples
  - espresso (100ml, 7g coffee, 0g milk powder)
  - latte (180ml, 8.5g coffee, 20g milk powder)
- Design a method cost in class CoffeeRecipe that computes the raw cost of a recipe. Water costs 1ct (no matter how much), coffee costs 1.2ct/g, and milk powder costs 0.3ct/g.

**Exercise 3: (Modeling - 2)**

A mobile phone tariff has a name. There is a monthly base fee, a price per minute, and a price per text message. The base fee may contain free bonus minutes (zero or more, but only full minutes). A user profile has a name, a number of monthly minutes on the phone, and a monthly count of text messages.

- Define classes for the entities occurring in this description and draw a class diagram.
- Implement the classes in Python and design a method calculate\_monthly\_price in the most suitable class.
- Given a user profile and a list of tariffs, define a function that computes the cheapest tariff for the user profile.

- Consider that a user profile is not 100% accurate: the monthly minutes and the monthly message count are really expected values of suitable normal distributions. Under these assumptions, what is your suggestion for computing the cheapest tariff.